

XI. OPTIONAL STREETLIGHT ORDINANCE - Ordinance Text

Note to the adopting authority: the intent of this section is that it only applies to streets and not to roadways or highways.

A. Preamble

The purpose of this Ordinance is to control the light pollution of street lighting, including all collectors, local streets, alleys, sidewalks and bike-ways, as defined by ANSI/IES RP-8 Standard Practice for Roadway and Street Lighting and in a manner consistent with the Model Lighting Ordinance.

B. Definitions

Roadway **or Highway** lighting is defined as lighting provided for freeways, expressways, limited access roadways, and roads on which pedestrians, cyclists, and parked vehicles are generally not present. The primary purpose of roadway **or highway** lighting is to help the motorist remain on the roadway and help with the detection of obstacles within and beyond the range of the vehicle's headlights.

Street lighting is defined as **lighting provided for** major, collector, and local roads **where** pedestrians and cyclists are generally present. The primary purpose of street lighting is to help the motorist identify obstacles, provide adequate visibility of pedestrians and cyclists, and assist in visual search tasks, both on and adjacent to the roadway.

Ornamental Street Lighting is defined as **a luminaire intended for illuminating streets that serves a decorative function in addition to providing optics that effectively deliver street lighting. It has a historical period appearance or decorative appearance, and has the following design characteristics:**

- designed to mount on a pole using an arm, pendant, or vertical tenon;
- opaque or translucent top and/or sides;
- an optical aperture that is either open or enclosed with a flat, sag or drop lens;
- mounted in a fixed position; and
- with its photometric output measured using Type C photometry per IESNA LM-75-01.

C. Scope

All street lighting not governed by ~~Federal or State~~ **regulations of federal, state or other superceding jurisdiction.**

EXCEPTION: lighting systems mounted less than 10.5 feet above street level and having less than 1000 initial lumens each.

25. We understand the reasons for separating this subject from the rest of MLO in a section of its own. However, it should not be optional.

Streetlighting is the major cause of light pollution in most places, and reducing that pollution should be a requirement, not an option.

RESPONSE: REJECTED - With the exception of requirements for new subdivision developments, municipal street lighting falls outside the purview of the Planning and Zoning Commission. Municipal street lighting usually falls under the jurisdiction of the Department of Public Works.

#10. The prefatory note to the adopting authority should be removed. The stated goals of roadway lighting, presented in the section C definition, are entirely compatible with the subsection F shielding requirement. (The exemption wording of Section III,B on page 8 for authorities adopting section XI should also be changed to remove exemption for roads and highways.)

RESPONSE: REJECTED - The intent of the MLO is to apply the recommendations to municipal streets - not state highways or roadways.

25. We believe comprehension would be enhanced if the page 38 ordinance text were reorganized so that Definitions preceded Scope and the substance of the text floating free at the top of the page were moved into Scope.

RESPONSE: ACCEPTED

25. Revise the definition of "street lighting" to make it parallel to "roadway lighting" and correct typographical error: Street lighting is defined as lighting provided for major, collector, and local roads where pedestrians and cyclists are generally present. The primary purpose of street lighting is to help the motorist identify obstacles, provide adequate visibility of pedestrians and cyclists, and assist in visual search tasks, both on and adjacent to the roadway.

RESPONSE: ACCEPTED - Both corrections made

#10. Subsection B, Scope, should read "All street and roadway lighting not governed by ~~Federal or State~~ federal, state, provincial, territorial, or commonwealth regulations."

RESPONSE: ACCEPTED IN PART - The intent of the MLO is to apply the recommendations to municipal streets - not state highways or roadways.

25. Revise the Exception under Scope since the 1000-lumen cap indicates that luminaires, rather than systems, are referred to: **EXCEPTION:** lighting systems luminaires mounted less than 10.5 feet above street level and having less than 1000 initial lumens each.

RESPONSE: REJECTED - Suggested rewording is too confusing - lacks clarity.

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- with its photometric output measured using Type C photometry per IESNA LM-75-01.

C. Scope

All street lighting not governed by Federal or State regulations of federal, state or other superceding jurisdiction.

EXCEPTION: lighting systems mounted less than 10.5 feet above street level and having less than 1000 initial lumens each.

29 Request: The Streetlighting Ordinance should be not be optional — it should be an integral part of the MLO architecture. Rationale: Streetlighting is the single greatest cause of light pollution. We must change the mindset of municipalities that the installations and practices over which they have jurisdiction (e.g. streetlighting) are exempt. We should not promote a scheme that says, effectively, “Do as I say, not as I do.”

RESPONSE: REJECTED - With the exception of requirements for new subdivision developments, municipal street lighting falls outside the purview of the Planning and Zoning Commission. Municipal street lighting usually falls under the jurisdiction of the Department of Public Works.

32 - General Comment.

We do not understand why this section is being created. It has been our understanding the MLO was to exclude any Street Lighting Guidance and allow the IES RP 8 document to determine proper lighting levels for them.

We see this section creating conflicting requirements and should not be part of the MLO document. If anything, a reference to use proper lighting levels as defined by the IES RP8 document should be used to replace this section of the document.

RESPONSE: REJECTED - The Task Force agreed early on to postpone the introduction of a Streetlight Section until a later date. Based on the substantial number of Public Comments received through April, 2009, the Task Force voted to include an abbreviated “Optional” Streetlight Ordinance Section. In the Preamble, the reader is referred to RP-8 for specific lighting levels.

43 - The optional streetlight ordinance is confusing due to unclear use of the terms “roadway” and “highway”

REASON: If the ordinance doesn't apply to “roadways” or “highways” (per note at top of section XI) then why is there a definition of “roadway lighting”? Is it to define what is excluded? What is the definition of “highway”?

RESPONSE: ACCEPTED - Highway has been inserted into the definitions where roadway lighting and highway lighting have the same meaning for the purpose of the MLO.

XI. OPTIONAL STREETLIGHT ORDINANCE - User's Guide

This section was added since the first public review. It is designed to work closely with the proposed revision to ANSI/IES RP-8 Standard Practice for Roadway and Street Lighting.

Street and roadway lighting is **one of the world's largest causes of artificial skyglow**. Many adopting agencies will recognize that the MLO will make privately owned lighting more efficient and environmentally responsible than their street lighting systems. But because the process of designing street lighting is often **requires more critical, precise lighting calculations**, applying the MLO directly to street lighting is not advised. Using existing standards of street lighting is recommended, particularly IES RP-8 and AASHTO standards.

Until a new recommended practice for street lighting can be developed, this section can serve to prevent most of the uplift of street lighting systems without setting specific requirements for the amount of light, uniformity of light, or other performance factors. Adopting agencies should include these basic improvements to street lighting along with regulations to private lighting.

“Lighting streets with “period” ornamental luminaires that evoke the look of a time when the light source was a gas flame can cause glare if high-lumen lamps are used. Such ornamental street lights should not exceed a BUG rating of G1. If additional illuminance and/or uniformity is desired, the ornamental fixtures should be supplemented by higher mounted fully shielded luminaires, as illustrated in RP-33-99.

Few street lighting warranting processes exist. The adopting agency needs to gauge whether a complex warranting systems is required, or if a simple one using posted speeds, presence of pedestrians, or other practical considerations is sufficient.

Examples of a current street lighting warranting system are included in the Transportation Association of Canada's Guide for the Design of Roadway Lighting 2006.

#35 - “Street and roadway lighting is the world's largest cause of artificial skyglow.” This claim absolutely requires a reference. In a references section, you can include the Canadian guide mentioned on this page.

RESPONSE: ACCEPTED IN PART - New wording added to make the statement less absolute

35 - What is meant by the word “critical”? Literally, reviewed by CRITICS in public presentations? LEGALLY risky because it involves driver safety? Urgently important because of high speed travel? This page requires editing.

RESPONSE: ACCEPTED - New wording added to improve clarity.

25. Delete last sentence of the 2nd paragraph on page 38. As noted above, AASHTO is still fighting fully shielded streetlighting. MLO should not be recommending their standards, and the relationship to RP-8 is adequately covered in the 1st and 3rd paragraphs.

RESPONSE: REJECTED - AASHTO recognizes curfews in street lighting practice

25. **NEW** We recommend addition of a new paragraph prior to the page 38 warranting discussion, as follows:

“Lighting streets with “period” ornamental luminaires that evoke the look of a time when the light source was a gas flame can cause glare if high-lumen lamps are used. It is recommended that such ornamental street lights not exceed a BUG rating of G1. If additional illuminance and/or uniformity is desired, the ornamental fixtures should be supplemented by higher mounted fully shielded luminaires, as illustrated in RP-33-99.”REASON 2. Even though it may not be a requirement, we believe it is worthwhile to point out the problem of inappropriately high lumen sources in ornamental streetlights...and how best to address that problem.

RESPONSE: ACCEPTED - with slight editorial modification.

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D. Master Lighting Plan

The Authority shall develop a Master Lighting Plan based on the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide GL-6, October 2005, Chapter 2. Such plan shall include, but not be limited to, the Adoption of Lighting Zones and:

1. Goals of street lighting in the jurisdiction by Lighting Zone
2. Assessment of the safety and security issues in the jurisdiction by Lighting Zone
3. Environmentally judicious use of resources by Lighting Zone
4. Energy use and efficiency by Lighting Zone
5. Curfews to reduce or extinguish lighting when no longer needed by Lighting Zone

E. Warranting

The Authority shall establish a warranting process to determine whether lighting is required. Such warranting process shall not assume the need for any lighting nor for continuous lighting unless conditions warrant the need. Lighting shall only be installed where warranted.

25. Replace the present "E" with the following:

E. Color of light

Any lamp used for street lighting shall have a Correlated Color Temperature no greater than 3000 kelvin. REASON 6. The rationale for capping CCT was presented in Section III. Limiting blue-rich street lighting will reduce glare and limit harmful environmental impacts.

RESPONSE: UNDER CONSIDERATION - Warranting should remain as Section E. A new section on the color of light has merit and will be considered

#23 - Section D - Master Plan

No small town will do this. They can and should have a plan, but this sounds more onerous than a simple plan. Then again, why does a local government adopt an ordinance that directs itself to make a plan?

RESPONSE: REJECTED - Local governments will adopt a Master Plan if they want to have a rational use of streetlight inventory and a basis of defense against any liability claims.

25. We recommend that D, Master Lighting Plan, be amended to delete references to Lighting Zones and to AASHTO. It also seems to us that warranting should certainly be an integral part of any Master Lighting Plan.

RESPONSE: REJECTED Lighting Zones are part of the MLO. AASHTO documents recognize the need for curfews and dimming.

25. We urge replacing the present "D" and "E" with the following:

D. Streetlight Planning

The Authority will develop a master plan for streetlighting incorporating an analysis of accident data and other safety information to determine whether streetlighting is warranted. This process will not assume there is a need for lighting, and lighting will only be installed where analysis indicates it may be warranted.

When such analysis indicates lighting may be warranted, the following additional factors will be considered:

1. Calculations of energy consumption and efficiency of proposed new lighting.
2. An assessment of environmental impacts of proposed new lighting.
3. Curfews to reduce or extinguish lighting when no longer needed.
4. Guidelines for determining whether/how the above should vary according to type of street (collector, local, etc.) and/or neighborhood.

REASON The Roadway Lighting Design Guide referred to on page 39 indicates that AASHTO is continuing to fight fully shielded streetlighting. It therefore makes no sense to cite said Guide in this section of MLO, which calls for no light to be emitted above 90 degrees. In addition, we believe sound streetlight planning can be done without reference to Lighting Zones since lighting requirements will be determined by type of street and specific neighborhood.

RESPONSE: REJECTED "Warranting" and "Streetlight Master Plan" follow the terminology and layout used in AASHTO's roadway lighting design guide which also recognizes the need for curfews and dimming. The MLO is better served using terminology consistent with AASHTO publications, such as "Warranting" and "Streetlight Master Plan". Therefore "D" and "E" should not be combined.

#23 - Section E - Warranting

4. More work should be done on warranting; many governments are hopelessly irresponsible and uninformed in this respect. This is a serious issue in small towns. This should be expanded to define situations where intersection lighting only is needed, where continuous lighting is not needed. Lacking the money to buy the IESNA roadway standard, I don't know whether it helps here, but small town officials won't buy it either and more should be included in the MLO.

RESPONSE: ACCEPTED FOR FUTURE EDITIONS

Page 39 - continued

#36 - Section F - For street lighting: no light emitted above 90 degrees. The problem with this is that as pedestrians are likely to be present (by definition of "street lighting"), some uplight is important in many areas. For example, downtown areas, historical areas, and other areas where pedestrians will be present in significant numbers, and where it is desirable for pedestrians to be present. The uplight striking buildings above the tops of the poles will give a general "well illuminated" feeling, which will make people feel safe and want to be there. In interior spaces, this is sometimes known as "volumetric" lighting, but the concept applies in many exterior applications as well.

Must appropriate lighting for these areas always be by "special permit"? How about specifying a BUG Uplight value (other than U0) that is appropriate according to the lighting zone.

RESPONSE: REJECTED - Uplight of buildings can occur from reflected light. Direct uplight, while increasing light on taller buildings, also casts much illumination skyward, as in up and down the street.

#16 - Thank you for the wording in section F that reads "all street lighting shall have no light emitted above 90 degrees". Now it applies to both HID and LED (relative and absolute photometry) and is technically correct! There may be resistance from some utilities to add a street light provision late in the process. Progress Energy was one of the first utilities to change to luminaires with no lighting above 90 degrees for street lighting for all new installs and all maintenance replacements. FYI – the vendor cost for a FCO cobra head is on average \$5 higher than a drop lens. We did this years ago and absorbed the cost. The one concern that a utility would have would be the amortization provision where after a certain number of years, the utility would be forced to change out all the luminaires for compliance. This leaves stranded costs for the utility since it would occur prior to luminaire failure. In some cases the utility may require a payment by the city for this type of change depending on their policies. So it becomes a cost issue, either for the utility or the city or both.

F. Light Shielding and Distribution

All street lighting shall have no light emitted above 90 degrees.

Exception: ~~By special permit only, o~~Ornamental street lighting for specific districts or projects shall **be permitted by special permit only, and shall** meet the requirements of Table H without the need for external field-added modifications.

#10 - in subsection F, the requirement should be more strict and should read "All street and roadway lighting shall have no light emitted above ~~90~~ 80 degrees." Street and roadway lighting should not, in general, emit either uplight or light in the 'glare zone' above 80 degrees.

RESPONSE: REJECTED - Roadway (Highway) lighting is not included in this edition of the MLO. Emitting no light above 80 degrees is too restrictive.

9 - Eliminate section F. This is counter-productive to the purpose of the dark sky initiatives, energy efficiency and good lighting practices. This issue has been debated and the results are clear. Having an arbitrary 0% uplight requirement will result in inferior lighting, excess energy consumption, excess reflected light. It is clear that no scientific evaluation was done to arrive at 0% above 90 degrees. If a luminaire has 2% uplight, but as a result can use 20% fewer total lumens to meet the lighting task than a luminaire with 0% uplight – reflect light will be reduced, total uplight will be reduced. I suggest applying table H page 40 to all lighting, not just ornamental.

Your committee has put forth a huge effort to get this far, but this last section appears to have been added with little forethought. As per the MLO notes, this section is more impactful than all the rest, and yet it is the least well done.

RESPONSE: REJECTED - Roadway (Highway) lighting is not included in this edition of the MLO. Street lighting is provided as more for pedestrian safety and requires different considerations. 0% uplight is appropriate for streetlight recommendations.

#10 - In section F. light shielding and distribution, the "Exception" bottom of page 39) should be revised to read as follows:

"By special permit only, ornamental street lighting for specific districts or projects shall meet that meets the requirements of Table H without the need for external field-added modifications."

The MLO should include some sort of absolute limit on the number of ornamental street lights permitted, perhaps dependent on the population or geographic area of the municipality eager to install them. The subsection F exception as written seems to provide a loophole by which a municipality could easily circumvent the general full shielding requirement of subsection F by issuing a "special permit" declaring most of the city a "specific district".

Ornamental lighting of roadways/highways should not be permitted.

RESPONSE: REJECTED - The suggestion that the MLO limit the number of ornamental streetlights is beyond the scope of the MLO.

25. For improved grammar and comprehension, we recommend revising the Exception under "F" as follows: ~~By special permit only, o~~Ornamental street lighting for specific districts or projects shall **be permitted only by special permit and only if the lighting meets** the requirements of Table H without the need for external field-added modifications.

RESPONSE: ACCEPTED - With editorial modification

Section XI - Streetlights - General Comments Pages 38-40

#10 - ADD New Subsection G and H G. Spectral Distribution Requirement

All street and roadway lighting shall have either a nominal correlated color temperature (CCT) no higher than 3500 Kelvin or emit less than 10% of total radiant power in the 380 nm to 500 nm band. Compliance with this requirement may, for example, be achieved by an appropriate field-added filter on an existing luminaire.

H. Amortization

On or before [amortization date], all street and roadway lighting shall comply with this Ordinance.

RESPONSE: Under Consideration: A new section on the color of light has merit and will be considered. Amortization will also be considered.

49 - Eliminate XI. Optional Streetlight Ordinance. Below is justification for the elimination of the optional street light ordinance section of the MLO.

XI. D. 5. Curfews to reduce or extinguish lighting when no longer needed by lighting zone. Street Lighting & Ornamental Street Lighting is designed for the illumination of the roadway but also plays a significant role in illuminating pedestrian walkways. Reducing or extinguishing lighting will cause the authority to incur a tremendous cost for controls and maintenance and create an unsafe condition for pedestrians in the area from criminal activity, uneven pathways and objects blocking their path.

XI. E. Warranting. Local Authorities generally do not have the expertise or staff to establish or monitor a warranting process. This will place an economic burden on the residents of that community.

XI. F. Light Shielding and Distribution. Street lights emitting no light above 90 degrees may work at high mounting heights, but when a Ornamental Street Lighting system is designed, the lights with little or no up light must be spaced closer together to achieve the proper light levels on the street. More lights to decrease "Artificial Sky glow" will result in more carbon released for the additional energy used. You have to also consider the reflected light contributing to Sky Glow from the additional lights required to comply with the ordinance

RESPONSE: REJECTED - The inclusion of the Optional Streetlight Ordinance is the result of the overwhelming support to include such a section, as evidenced by the number of Public Comments submitted through April 2009. Curfews are not all or nothing. The Authority may selectively choose which lights require dusk to dawn service and which lights can be dimmed or subjected to curfew. Ornamental street lighting is provided special upright allowances in Table H.

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E. Warranting

The Authority shall establish a warranting process to determine whether lighting is required. Such warranting process shall not assume the need for any lighting nor for continuous lighting unless conditions warrant the need. Lighting shall only be installed where warranted.

F. Light Shielding and Distribution

All street lighting shall have no light emitted above 90 degrees.

Exception: By special permit only, ornamental street lighting for specific districts or projects shall meet the requirements of Table H-1 without the need for external field-added modifications.

51 - General Comment - I am a lighting engineer for American Electric Power. We are in 11 states and have over a million lights. We want Section XI removed from the MLO. It will cause security problems and a tremendous amount of extra expense for us and our customers. We are very concerned about the extra liability this Section would cause our company. Thanks for allowing the comment.

RESPONSE: REJECTED - There is no liability burden on the utility company, when the lighting is specified by the municipality

53 - The implementation of this section could place a utility with an extreme undue burden to replace hundreds, and even thousands of usable assets in order to comply. For example, to try to replace a drop lens streetlight system, by attrition, with a flat lens system will not work photometrically. It would need to be completely re-designed. Section XI should not have been added.

RESPONSE: REJECTED - The utility company usually has premature abandonment penalties to compensate for equipment retired early. A significant amount of streetlighting is not based on photometric distribution, as is the case where streetlights are attached to wooden poles used for carrying electrical transmission lines.

XI. OPTIONAL STREETLIGHT ORDINANCE - Ordinance Text

Table H - Uplight Control Requirements for Street Lights by Special Permit for Ornamental Street Lighting Only

Lighting Zone	Maximum Uplight Rating
LZ-0	U-0
LZ-1	U- 1 2
LZ-2	U- 2 3
LZ-3	U- 3 4
LZ-4	U-4



#10 - In Table H, page 40, uplight control requirements for ornamental street lights, the maximums are too lenient. Regardless of lighting zone, no ornamental light should be permitted uplight of U3 or higher. Even a rating of U2 seems excessive – except perhaps in LZ 4.

Accordingly, uplight limits for ornamental street and roadway lighting in Table H should be:

- LZ 0 - U0
- LZ 1 - U0
- LZ 2 - U1
- LZ 3 - U1
- LZ 4 - U2

As noted elsewhere, various manufacturers are now producing LED versions of prismatic refractor ornamental luminaires – which are often offered with 4000K as the lowest available CCT. Loosely regulated or widespread use of such luminaires in general street & roadway lighting would be expected to greatly increase sky glow due to the large amount of bright blue-white light they shine up into the atmosphere.

RESPONSE: ACCEPTED IN PART - See Table H-1

23 - Section F - Table H - 5. The no-uplight provision is good. Raise the Table H requirements to U0 in LZ1 and 1, 2, and 3 in LZs 2, 3, and 4 respectively and put on more stringent restrictions than simply “by special permit”, such as historical, factually supported justifications. Vague portmanteau words like “antique” or “historic” should not be permitted as the sole justification. The Yellowstone National Park process of research into what is truly historic should be the model. The 1930s and 1940s are not “historical” or “period” to people in their 70s like me —they are contemporary. In other words, acorns are neither historical or period or antique.

RESPONSE: REJECTED - Periodic, Historic or Antique are relative terms to be defined by the Governing Body.

25. Change the Table H values so that LZ 3 and LZ 4 are U2.

REASON 8. While small amounts of uplight may be justified for ornamental streetlights, the present allowances for LZ 3 and 4 are excessive.

RESPONSE: ACCEPTED - See Table H-1